

## 7.5 - Solving Logarithmic Equations

Objective: To solve logarithmic equations

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### Types of Equations:

Extraneous solutions: any answer that produces log of a negative number.

Type 1: LOG = # - use swirl method and solve.

1)  $\log_3 243 = y$

$$3^y = 243$$

$$\boxed{y = 5}$$

2)  $\log_9 x = -3$

$$9^{-3} = x$$

$$\boxed{x = \frac{1}{729}}$$

3)  $\log_4 256 = 4$

$$x^4 = 256$$

$$\boxed{x = 4}$$

Try these:

4)  $\log_{10}(4x) = 2$

$$10^2 = 4x$$

$$100 = 4x$$

$$\boxed{25 = x}$$

5)  $\log_2 2x = 4$

$$2^4 = 2x$$

$$16 = 2x$$

$$\boxed{8 = x}$$

Type 2: LOG = LOG - cancel logs (if base is the same) and solve. can only cancel one log on each side of = (if base is the same)

6)  $\log_3(3x - 6) = \log_3(2x + 1)$

$$3x - 6 = 2x + 1$$

$$-2x + 6 = 2x + 1$$

$$\boxed{x = 7}$$

7)  $\log_2(x^2 + 7x) = \log_2(18)$

$$x^2 + 7x = 18$$

$$x^2 + 7x - 18 = 0$$

$$(x - 2)(x + 9) = 0$$

$$\boxed{x = 2, -9}$$

Try these:

8)  $\log_5(2x + 7) = \log_5(3x + 1)$

$$2x + 7 = 3x + 1$$

$$-2x - 1 = -2x - 1$$

$$\boxed{6 = x}$$

9)  $\log_6(x^2 + 6x) = \log_6(16)$

$$x^2 + 6x = 16$$

$$x^2 + 6x - 16 = 0$$

$$(x + 8)(x - 2) = 0$$

$$\boxed{x = -8, 2}$$

H/W - pg 31 # 1-10

